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SOFTWARE'S OTHER BILLIONAIRE

Oracle CEO Larry Ellison is racing Bill Gates to bring you access to the world's information

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FORTUNE

ABOVE: The Oracle Media Server being created by this team is just one of the payoffs from work on massively parallel processing. Photograph by Louis Psihoyos (Matrix).

"In the software world, a tremendous amount of invention is required to make this work." 38

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ORACLE®

Lawrence J. Ellison
President and
Chief Executive Officer

Oracle Corporation
500 Oracle Parkway
Redwood Shores
California 94065

December 7, 1993

Mr. Brewster Kahle
President
Wais Inc.
1040 Noel Drive
Menlo Park, California 94025

Dear Mr. Kahle:

With the "information highway" forever changing the way we do business, the decisions you make in the next year will determine how much your organization will profit in the next decade.

That's why I want to personally invite you to the first event that showcases actual real-time, working technology that makes the information highway a reality.

Please join me for an hour on January 18th. We'll hear from some of the country's most visionary leaders as they discuss how the information highway will radically alter the way products and services are marketed and distributed.

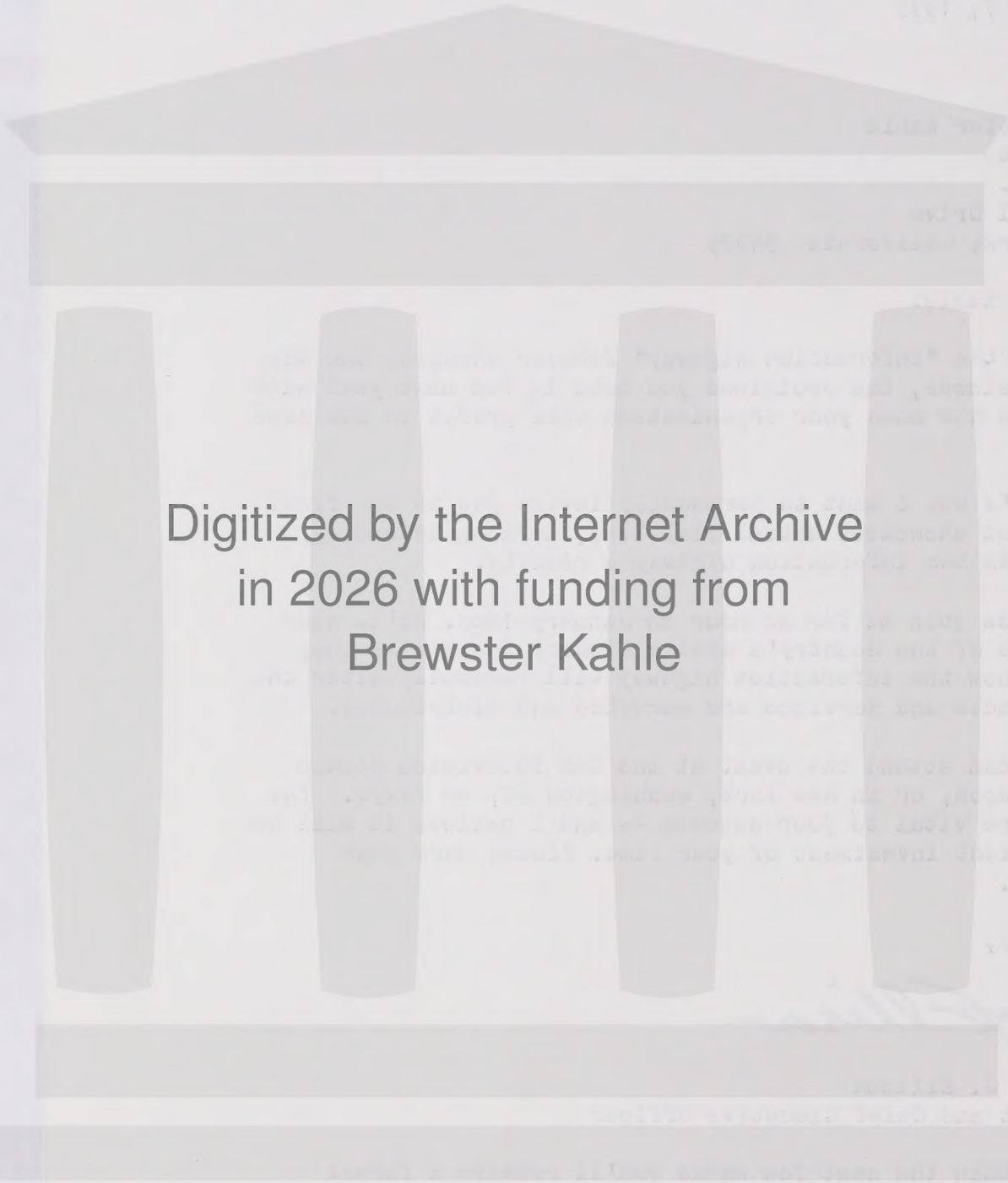
You can attend the event at the CBS Television Studio in Hollywood, or in New York, Washington DC, or Tokyo. The issues are vital to your success -- and I believe it will be an excellent investment of your time. Please mark your calendar.

Sincerely,

Larry Ellison

Lawrence J. Ellison
President and Chief Executive Officer

P.S. Within the next few weeks you'll receive a formal invitation. I hope you'll be able to join us.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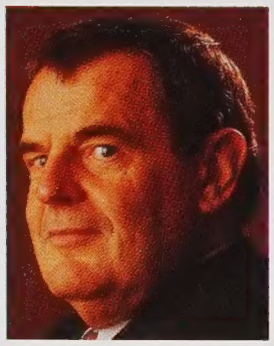

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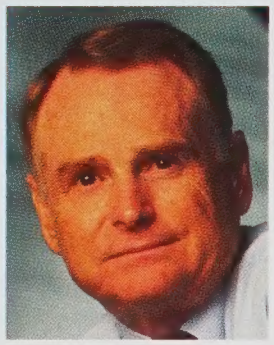

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COVER: Software billionaire Larry Ellison at his Japanese-style house in Atherton, California, photographed by Louis Psihoyos (Matrix).

PHOTOGRAPHS BY LOUIS PSIHOYOS—MATRIX

FORTUNE

THE NEXT BIG INFO TECH BATTLE

Oracle CEO Larry Ellison, Silicon Valley's latest super-billionaire, is racing Bill Gates to bring you electronic access to the world's information. ■ ***by Alan Deutschman***

■ In his Japanese-style garden, Ellison ponders his plan to change the ways knowledge is amassed and stored.

CONQUERORS built El Camino Real (Spanish for "the royal way") in the 18th century as a dirt road connecting the missions of California. Its northern end is now a congested highway, lined with strip malls and fast-food joints, slicing straight through Silicon Valley. Nearby residential plots are wedged together as tightly as transistors on a microprocessor. High-tech millionaires—California's latest conquerors—eagerly pay huge sums for houses with great views of one another's living rooms. Even Atherton, a carefully zoned enclave with some of the largest, most private lots, sits uncomfortably close to the commercial strip. There, on a side street off El Camino, in a Japanese-style mansion fit for a warlord, buffered by spacious gardens, ponds, and man-made waterfalls, resides Oracle Systems Corp. Chief Executive Lawrence Ellison, 49, the son of Russian Jewish immigrants, raised in a tenement on the South Side of Chicago.

Compared with the other software billionaires—Bill Gates, Paul Allen, and Steve Ballmer, who got rich from Microsoft, and Ray Noorda, whose font of money is Novell—Ellison is an outsider. The others belong to the world of personal computers; Ellison's work falls in the realm of mainframes and other large systems. Ellison stands out in another way: He actually looks and acts super-rich. He's tall, thin, and urbane, turned out in double-breasted English suits or black silk Japanese sports shirts with black slacks. He wears loafers, not laced shoes, so he can easily slip them off and enter the chamber of the house where he conducts a formal Japanese tea ceremony. The tea room opens onto an

outdoor platform sited for optimum views of the full moon and cantilevered above a pond stocked with Japanese *koi*. Ellison leads visitors down a hallway, past a finely detailed tableau depicting Japanese civil wars, to his collection of samurai armor, swords, and helmets (without their original companion pieces, the severed heads of the soldiers who wore them).

One room shatters the imperial image. Ellison's home office is cluttered with messy piles of papers and books, incongruously for the workplace of a man whose business is managing information. With $1.6 billion in annual sales, Oracle is the No. 1 producer of software for corporate databases—gargantuan interlinked spreadsheets with rows and columns for storing literally billions of numbers and characters. These databases, installed in central computers called servers that are connected to far-flung networks of PCs or terminals, help manage the world's manufacturing processes, accounting and personnel records, and airline reservation systems. Ellison owns 23% of Oracle's stock, worth $2 billion.

The mess on Ellison's desk is a reminder that the overwhelming bulk of the information people need and use exists beyond the reach of computers. It proliferates on paper or in other media such as audiotape, videotape, and film—a universe of data waiting to be digitized so that machines can store, read, search, sort, analyze, manipulate, and transmit it.

As the sun bears down on his patio and an Asian housemaid serves hot green tea, Ellison speaks expansively of his company's Alexandria Project. It aims at nothing less than using computers to change the way human knowledge is amassed and stored. The name, Ellison explains, evokes the ancient Greeks' attempt to build a library containing copies of all the world's published works. The Greeks assembled more than 500,000 volumes in Alexandria before early Christians burned the site in 391 A.D. By the Middle Ages, the biggest collection extant was the 2,000 volumes housed at Christ Church priory in Canterbury. Five hundred years after Gutenberg, a major library like the New York Public holds 11 million books.

Oracle envisions multimedia databases that are unfathomably larger, encompassing in digitized form not merely the texts and illustrations of the world's books and periodicals but also the film and TV libraries of Hollywood, endless streams of news coverage, and much more. Ellison wants to create global consumer bazaars so that makers of fine bronze vases in Korea and hand-loomed silk pants in Thailand can display and sell their goods electronically to the American public. He wants to bring into being global consumer credit markets so that people in Des Moines will be able to shop for a loan from Deutsche Bank.

GEORGE LANGE

■ Gates thinks the info highway is computing's future—and Microsoft's.

The database systems that would make such wonders possible would be 10,000 to one million times larger than those that Oracle sells today. Consider: The central database at a FORTUNE 500 company typically ranges from ten to 50 gigabytes (billions of characters). One of the largest, American Airlines' Sabre reservation system, takes up 100 gigabytes. But that same vast amount of computer memory would accommodate an on-line library of only 50 movies. Some Blockbuster video stores carry as many as 10,000 cassettes, the equivalent of 20 terabytes (trillions of bytes).

In Ellison's vision, multimedia databases are destined to serve as centers of global commerce and learning. They will become the most important destinations on the information highway—the high-speed digital communications network that America's telephone and cable TV companies are racing to build. Business people and consumers will tap into them using any number of devices—telephones, interactive TVs, PCs, PDAs (hand-held personal digital assistants)—made by any manufacturer. In this electronic Babel, the database systems will function as interpreters, enabling otherwise incompatible devices to share information. Users will be able to send and retrieve text, graphics, video, and audio, and they'll be able to do it over phone lines or TV cables or tomorrow's wireless networks. In short: The databases will provide any kind of information anytime, anywhere, over any network, to anyone with any kind of digital receiving device.

A fantasist's pipe dream? Think again. Powerhouses such as AT&T, IBM, Tandem Computers, and Silicon Graphics are racing to build hardware for the new networks. Ellison recently jolted them all by announcing that he already *has* the hardware and software to handle multimedia databases larger than any other company has tried to build. The hardware: a line of so-called massively parallel processors built by nCube Corp., a ten-year-old manufacturer in Foster City, California, that Ellison controls. The software: Oracle's flagship database management program, rewritten to run on massively parallel machines and greatly expanded to accommodate video, audio, and textual data. Even for a billionaire, the products represent an audacious gamble: Ellison has staked a reported $60 million of his own money on nCube, and the new software tied up many of Oracle's best engineers for the past five years.

continued

REPORTER ASSOCIATE *Joyce E. Davis*

Ellison's quest puts him on a collision course with another software billionaire, Bill Gates. Gates, 38, is pursuing a similar vision, which he calls "information at your fingertips." He considers it the key to Microsoft's survival. Listen to R&D chief Nathan Myhrvold, 34, a teddy-bearish savant who studied physics at Princeton and cosmology at Cambridge and whom Gates sees as his technology guru: "We believe the notion of the information highway is the future of Microsoft. It's the future of computing. It's the future of communications. And it's the future of software, because software is what will bind computing and communications together. Software is what takes the raw capabilities and harnesses them into a form people can use. It is very, very important to us." Gates says the PC industry will become obsolete unless it takes the lead in defining how the new networks will function.

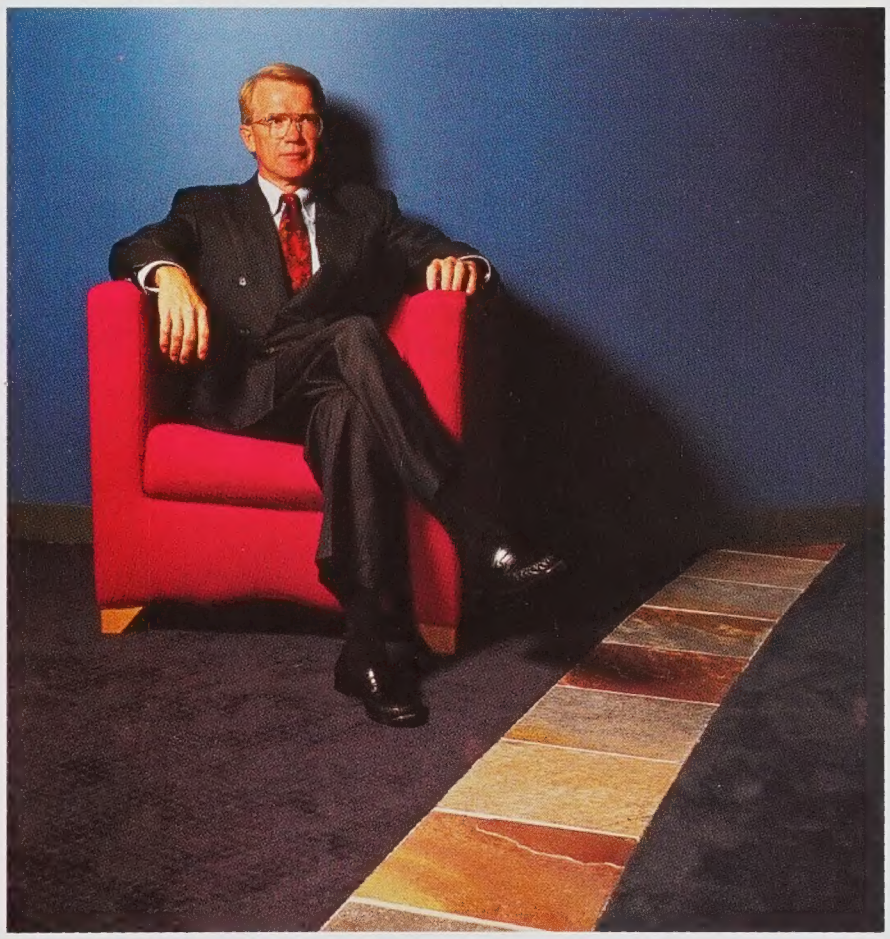
Myhrvold heads Microsoft's push to develop technology that makes this new field more than a dream. The work spans everything from arcane software that will synchronize the flow of data on the network to ways of making interactive TV appeal to couch potatoes—making it, in the words of a Microsoft technician, "mindlessly simple to use." To pay for the work, Gates says he's writing Myhrvold checks totaling $100 million a year—nearly a fourth of Microsoft's R&D budget. (By comparison, the arduous three-year development of Microsoft's newest and most advanced operating system software, Windows NT, cost about $150 million.) Myhrvold's team, only 50 people a year ago, is up to 300 and slated to double again soon. Gates says he's contributing one-third of his time—and around 90% of his IQ—to Myhrvold.

The Gates-Ellison battle promises to be acrimonious and fierce. Gates and Microsoft are perhaps the only CEO and company in the industry that match Ellison and Oracle for aggressiveness, drive, tenacity, chutzpah, and unbridled self-confidence. Each company got its big break at IBM's expense (Ellison lifted the idea for Oracle's software from an IBM research paper—and beat Big Blue to market; Gates famously sold IBM the operating system for its original PCs). Each is envied, resented, and even despised by competitors; each has used bare-knuckle business tactics that nearly resulted in legal censure.

THE EXPERT CONSENSUS on the information highway—a widely discussed but shallowly understood idea—has shifted radically in the past year. The dominant vision in 1992, now all but abandoned, was of a souped-up cable-TV network. Cable operators would install digital transmitters and optical fiber to make their systems faster and more capacious, thereby increasing the number of available channels to 500 or so. That way, when *Terminator 3* appears, cable operators could offer it on a pay-per-view basis and broadcast versions over different channels at 8:00, 8:05, 8:10, and so on, so that people could see the movie whenever they wanted. If you were watching the 8:20 showing and needed a ten-minute break, you could return to the couch, switch over to the 8:30 showing, and pick up the mayhem without missing a morphing.

That 500-channel system will never materialize because it is already obsolete. Instead, cable TV and phone companies are going ahead full tilt with a more ambitious, technically more difficult approach. They are creating fast, cheap, truly interactive digital networks that merge the best features of cable TV and telephones. These will enable any user to call any other user and to send and receive everything from simple data to full-motion video.

The shift opens enormous opportunities for makers of computer hardware and software. A year ago, software companies' prospects seemed limited to trying to sell cable CEOs, a notoriously sharp-penciled bunch, on relatively simple software that would sit in a box atop the TV set and help viewers channel-surf. Microsoft was exploring the idea in an alliance with Intel and General Instrument, the No. 1 maker of set-top boxes.



ANDY FREEBERG

■ Silicon Graphics CEO Ed McCracken will bring movies on demand to Orlando.

Instead, cable and phone CEOs are now willing to spend tens of billions of dollars rewiring America because they believe that interactive information, entertainment, and shopping services will be popular enough to throw off huge profits. The biggest moneymaker of all, many think, will be video on demand. It will enable people to summon movies at any time and use their interactive TVs as "virtual VCRs" that can stop, restart, rewind, or fast-forward at will.

Computer companies hope to cash in by selling huge, centralized systems called video servers that will store the movies and arrange their delivery. Hollywood studios like Warner Bros. and Paramount will probably want to own such systems, and telephone and cable companies will operate video servers too.

Video servers pose a daunting technical challenge because they must pump out overwhelming amounts of data at lightning speed. Millions of people would use the service at the same time—and each must receive a unique stream of data sent from the video server at the rate of 30 video frames, or 500,000 bytes, a second. Pulling this off inexpensively is going to be tough. Fiber-optic cables can transmit dozens of gigabytes a second, but even the most powerful conventional computers can't feed the

data into a network nearly that quickly. Says Craig Mundie, 44, a veteran designer of massively parallel computers who is leading Microsoft's charge along with Myhrvold and Gates: "In the software world, a tremendous amount of invention is required to make this work."

So what's behind those video-on-demand trials that are so widely reported in the newspapers? Smoke and mirrors, often. In Denver, for example, Tele-Communications Inc. has teamed with AT&T and US West to test consumer reaction to the service. Users order movies by typing in codes on their remote controls; the video server consists of a big room with scores of VCRs on racks and employees running back and forth to fetch videotapes as the orders come in. Pretty low-tech. For its trial next April in Orlando, Time Warner, parent of FORTUNE's publisher, is using real digital technology—a $2 million Silicon Graphics supercomputer system. The designers expect it to generate 1,000 simultaneous video streams. That's better than conventional mainframe computers, which can't deliver video on demand to more than 100 viewers at a time and cost millions of dollars more. But at an estimated capital cost of at least $2,000 per subscriber, the Silicon Graphics system is much more expensive than a cable or phone company would tolerate for a large-scale rollout.

LARRY ELLISON never set out to attack this problem at all. Disarmingly funny, quick-witted, and something of a renegade, he drifted into the computer business just out of college in the 1960s. He studied math and physics at the University of Chicago but left without a degree because he refused to take a proficiency test in French. He headed to Silicon Valley, taught himself programming, and joined Amdahl, where he helped create the first clones of IBM's mainframes.

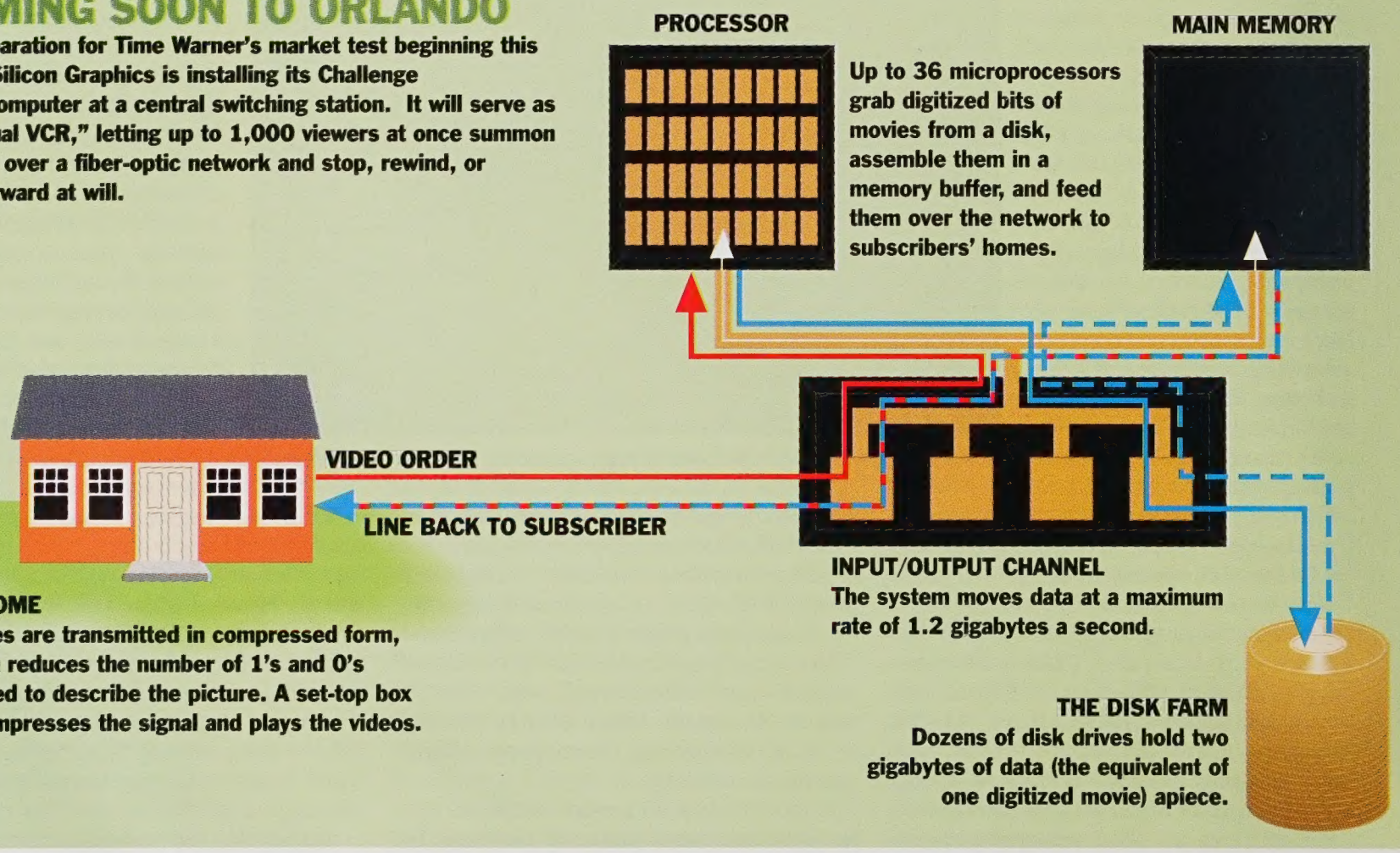
In 1977 he co-founded Oracle. His inspiration came from that IBM research publication, which described a method of data management called a relational database. Unlike earlier so-called hierarchical databases, IBM's invention didn't require users to define rigidly ahead of time all the ways they would like to analyze their data. Instead, they could cut and shuffle information as they pleased. A sales executive, for instance, might review his division's performance by product, customer, salesperson, region, or time period. The data would be stored in central computers connected to networks of terminals, enabling several hundred people to tap into the system at once.

Foreseeing that IBM would eventually turn these ideas into products and set an industry-wide standard, Ellison and co-founder Bob Miner wrote their own database program and got it to market three years ahead of Big Blue. While IBM's version ran only on the company's expensive mainframes, Ellison prodded his engineers to adapt Oracle's software to run on mainframes and smaller computers from almost any manufacturer. That made Oracle a tempting alternative for IBM customers looking for less costly ways to manage data.

During the 1980s, sales and operating profits doubled every year. Ellison, who fell in love with Japanese culture on business trips there, led a Japanese-style push for market share. It gained Oracle a Microsoft-like reputation for ruthlessness, cutthroat pricing, and promising more than it could deliver. But Oracle succeeded in outselling IBM and remains the No. 1 relational data-

COMING SOON TO ORLANDO

In preparation for Time Warner's market test beginning this April, Silicon Graphics is installing its Challenge supercomputer at a central switching station. It will serve as a "virtual VCR," letting up to 1,000 viewers at once summon movies over a fiber-optic network and stop, rewind, or fast-forward at will.


PROCESSOR
MAIN MEMORY
Up to 36 microprocessors grab digitized bits of movies from a disk, assemble them in a memory buffer, and feed them over the network to subscribers' homes.
VIDEO ORDER
LINE BACK TO SUBSCRIBER
AT HOME
Movies are transmitted in compressed form, which reduces the number of 1's and 0's needed to describe the picture. A set-top box decompresses the signal and plays the videos.
INPUT/OUTPUT CHANNEL
The system moves data at a maximum rate of 1.2 gigabytes a second.
THE DISK FARM
Dozens of disk drives hold two gigabytes of data (the equivalent of one digitized movie) apiece.

■ NCube co-founder Stephen Colley made Ellison a believer in massively parallel supercomputers. Inside the box: 1,000 microprocessors harnessed together.

base software provider, with a 34% market share, vs. 26% for IBM, according to the Gartner Group, a Stamford, Connecticut, research firm.

Ellison's fascination with massively parallel processing began in 1987 after a chance meeting with Stephen Colley, 40, a former Intel chip designer who co-founded nCube. Massively parallel supercomputers string together hundreds or thousands of cheap microprocessors in a single system—like taking a local area network of a thousand PCs spread throughout a skyscraper and shrinking it to fit inside a filing cabinet.

Such machines are unorthodox in that they lack a single central memory. That avoids a problem that afflicts conventional computers, from the smallest PC to the largest mainframe: The data pathway to and from the memory becomes a bottleneck that limits the system's overall speed. (This difficulty is what has stalled the progress of mainframes.) In an nCube, each microprocessor has its own small module of memory, a multitude of connections to other microprocessors, and a direct link to the outside world—so there's ample room for data to move and no chokepoint.

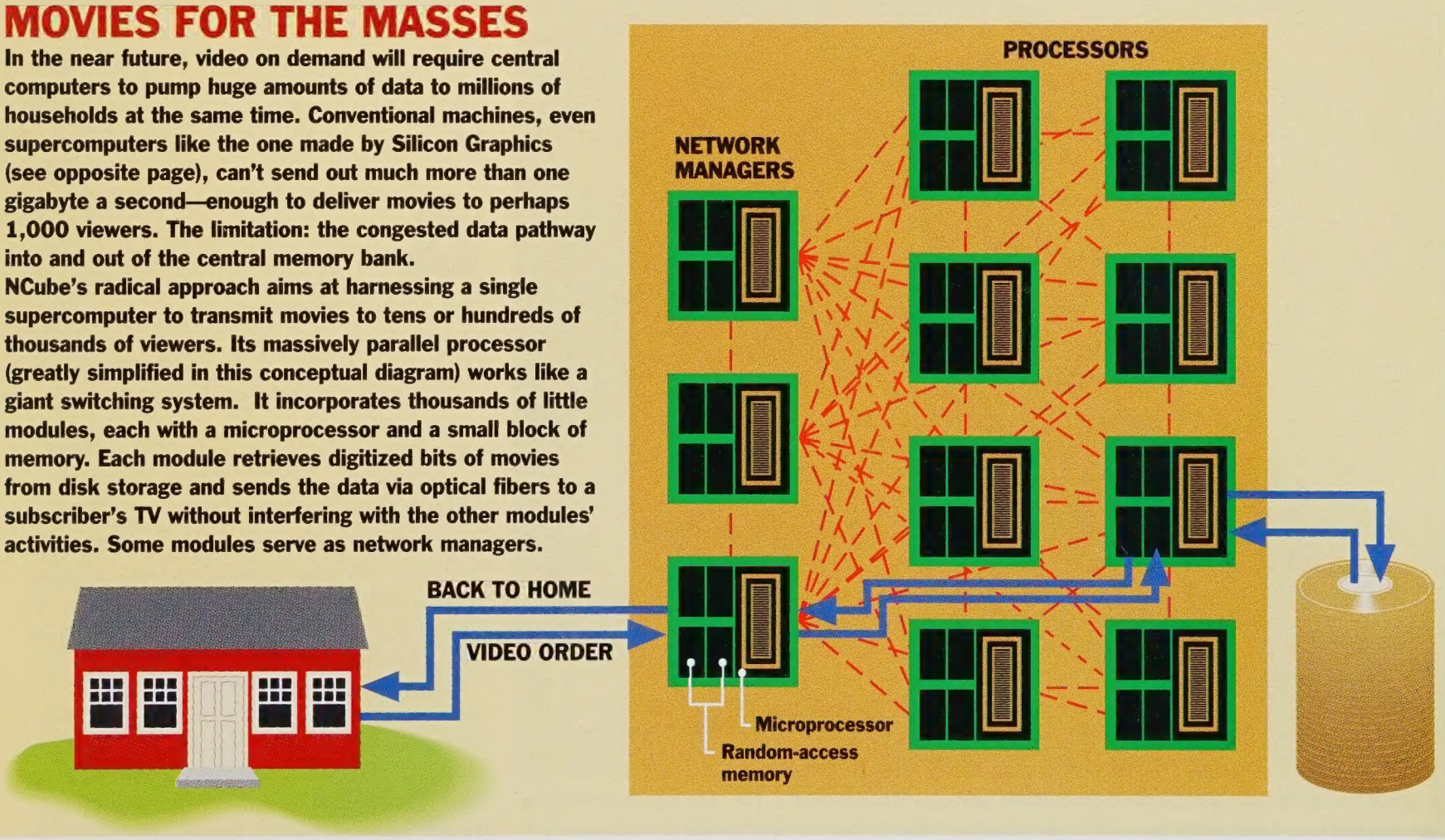
By the time Ellison and Colley met, nCube was producing machines with 1,000 microprocessors. As with other makers of massively parallel systems, nCube's sales were mostly limited to university and government labs with scientific problems that required lots of number crunching. Colley wanted to expand into the corporate market, so he went calling on database software companies, pitching his machines as a way to run bigger, faster databases less expensively. Only Oracle gave him a hearing, but the response wasn't what Colley had in mind. Oracle assigned an aggressive salesman in hopes of getting nCube to buy its software. Colley said he wasn't interested, but the salesman wouldn't give up. He brought Ellison himself to meet with the entrepreneur.

Still no sale. Afterward, however, Ellison happened to look over an nCube brochure Colley had given him. "I was really startled," he recalls. He prided himself on his knowledge of the latest big computers, but the claims made about the performance and design of this machine were ludicrous, obviously the work of some marketing bozo with no grasp of technology. So he called Colley, who insisted the claims were accurate. "You're telling me that everyone else

MOVIES FOR THE MASSES

In the near future, video on demand will require central computers to pump huge amounts of data to millions of households at the same time. Conventional machines, even supercomputers like the one made by Silicon Graphics (see opposite page), can't send out much more than one gigabyte a second—enough to deliver movies to perhaps 1,000 viewers. The limitation: the congested data pathway into and out of the central memory bank.

NCube's radical approach aims at harnessing a single supercomputer to transmit movies to tens or hundreds of thousands of viewers. Its massively parallel processor (greatly simplified in this conceptual diagram) works like a giant switching system. It incorporates thousands of little modules, each with a microprocessor and a small block of memory. Each module retrieves digitized bits of movies from disk storage and sends the data via optical fibers to a subscriber's TV without interfering with the other modules' activities. Some modules serve as network managers.



in the world is building computers incorrectly, and you know the correct way?" asked Ellison. Even for a massively parallel computer, nCube's design was radical. The products of the industry leaders, Intel and Thinking Machines of Cambridge, Massachusetts, were inherently limited because each processor did a piece of the same task at the same time, like a hundred synchronized swimmers performing a routine. The processors in the nCube could work independently on separate tasks.

Skeptical but intrigued, Ellison spoke with Colley repeatedly over 18 months. Ultimately he became convinced that massively parallel computing would change the course of the whole industry. He found it frustrating that while mainframes offered the reliability and central control crucial for managing big databases, computing power was far cheaper in the form of PCs. As a result, companies had begun pushing as many mainframe tasks as possible onto networks of smaller machines—but those networks were difficult to assemble and manage.

Ellison figured that massively parallel processors would reverse this trend. Today the fastest IBM mainframe, which sells for $15 million, clocks in at 600 mips (millions of instructions per second, a standard measure of computing speed). That's just six times faster than a PC built around Intel's vastly cheaper Pentium microprocessor. By contrast, the fastest nCube runs at 123,000 mips, over 200 times faster than the mainframe, and costs $30 million, one-hundredth the price per mips.

In 1988, over the protests of other Oracle executives, Ellison decreed that all future versions of Oracle's software would be written to run on nCubes and other massively parallel processors as well as conventional machines. His lieutenants thought the boss had joined the lunatic fringe. Computers with hundreds of separate "brains" attached to hundreds of separate memories are exceptionally hard to program. Even so, Ellison was obsessed enough to bet even more heavily, buying a controlling stake in nCube in 1989 and later installing his own CEO. Colley remains as chairman. Since then, nCube has scored with sales to high-profile customers like BMW (for engine design), Hoechst Celanese (drugs and polymers), Mitsubishi (simulating the Tokyo power grid), and Shell Oil (oil exploration), which calls nCubes the most reliable computers it has ever owned. The machines have captured 65% of the market for massively parallel systems in Japan.

■ **Oracle's video team rewires a laboratory to test hookups of computers to TVs. The company recently unveiled software designed to pipe movies on demand to tens of thousands of homes simultaneously.**

Ellison admits that the vexing effort to program massively parallel processors has contributed to long delays in the last two major upgrades of Oracle's software. But he says the gamble is about to pay off. After yearlong tests on nCube machines at General Motors, Ford Motor, and other companies, Oracle released the massively-parallel-processor version of its database software November 1. The software also runs on processors from six other manufacturers, including Thinking Machines and AT&T's NCR division. But it will help sell nCube computers—giving Ellison a chance to clean up two ways.

ALL ALONG, Ellison never gave a thought to the information highway. He was always intent on expanding the relational database business. He awoke to the opportunity early this year when British Telecom, the $23-billion-a-year phone giant, asked Oracle if it had software to run a video server. Never a company to pass up a potential sale, Oracle studied the idea. Astonishingly, Ellison's engineers determined that handling video, seemingly a huge problem, would be easy because of the work they had already done on massively parallel systems. Ellison recognized that he had become a player in one of the hottest games around. "Better to be lucky than smart," he deadpans.

Once Ellison's conception of Oracle's future changed, he set about recasting himself as a multimedia visionary. He reorganized the product strategies of both Oracle and nCube around the electronic highway. In the future, Oracle's flagship product will

include not only a relational database but also software for managing a video server, an audio server that can store and play CD-quality sound, and a text server for indexing, searching, and summarizing documents. Ellison is even changing the name of the software from Oracle Relational Database to Oracle Media Server.

He now presents nCube machines as video servers. He says the nCube2 computer, made up of as many as 8,192 microprocessors, will be able to deliver video on demand to 30,000 users simultaneously by early 1994, at a capital cost of $600 per viewer. The next-generation nCube3, due in early 1995, will pack 65,000 microprocessors into a box the size of a walk-in closet and will handle 150,000 concurrent users at $300 apiece.

Ellison's top lieutenants at Oracle have fanned out in search of information-highway alliances. Wooing the world's 15 biggest phone companies are Chairman James Abrahamson, 60, a retired Air Force general who ran NASA and later Star Wars, and vice president John Kish, 37, a former math professor with a Johns Hopkins Ph.D. Oracle is reportedly in the running against IBM's workstation division to provide Bell Atlantic with video servers that would bring movies on demand to 130,000 New Jersey and Virginia homes. Abrahamson is also courting federal agencies. Last month the U.S. Patent and Trademark Office, which wants to construct a vast text-and-drawings database, was so impressed with Oracle technology that it asked the White House for permission to buy the system without soliciting rival bids. Oracle vice president Dick Brass, 42, a brash, mustachioed ex-reporter for the New York *Post* and *Daily News*, is out seeking publishing customers, while marketing chief Terry Garnett, 36, a onetime adviser to Wall Street raider Saul Steinberg, is schmoozing the Hollywood crowd.

ANYONE CALLING on top executives in the phone, cable, and media worlds eventually crosses paths with Bill Gates. Gates spends much of his time cultivating media titans he refers to by their first names, like "Jerry" (Levin of Time Warner) and "John" (Malone of TCI). Important as the electronic highway is to Microsoft's future growth, it also seriously threatens Microsoft's dominance. The profusion of programming that will flow over the electronic highway, and the myriad devices that it will play on, have already led Microsoft to abandon the idea of dictating a standard look and feel—as it does with personal computing. But Microsoft, like Oracle, is looking to create software that pulls everything on the highway together by linking customers to the multimedia servers on the network.

Gates professes to like Ellison personally, but he and his executives denigrate Oracle's engineers and condemn Ellison's vision of the information highway as too narrow. Myhrvold says Oracle mistakenly believes database software and massively parallel processors alone will unlock the multimedia future: "If your only tool is a hammer, everything looks like a nail."

What's more, says Gates, Ellison overestimates the speed at which the information highway will arrive. Gates doesn't expect large-scale rollouts of services such as video on demand until 1996 at the earliest, and warns that rivals coming out prematurely with inadequate systems will be embarrassed, as Apple has been with its Newton PDA. Oracle responds that Gates is sowing doubt about how quickly the video server market will develop in order to neutralize Oracle's head start. Says marketing chief Garnett: "Gates is telling all the telephone companies, 'I'll have this in '95 or '96, so wait.' "

Of the two companies, Microsoft has far more to lose if the electronic highway arrives slowly. The relational database market seems sure to keep expanding; security analysts expect Oracle to maintain its 20% annual growth rate for years. But Microsoft, accustomed to annual sales growth of 30% to 50%, faces the first dramatic slowdown in its history. Microsoft derives most of its profits from selling word-processing and spreadsheet programs, but the markets for those products are approaching saturation.

In a July speech to security analysts, Gates explained hypothetically how the Microsoft slowdown might unfold. If Microsoft had to rely solely on existing product lines for growth, he said, the company might expand only 5% to 10% a year. Maintaining a growth rate of even 10% to 15%, puny by Microsoft standards, would require $500 million annually of incremental revenues from new products. But, he continued, Microsoft's R&D projects "certainly won't generate $500 million in the next couple of years."

Turning to the company's hopes for the electronic highway, he added: "I don't think it will generate any significant revenue during the next three years. In fact, I think we will lose many tens of millions of dollars investing in it before it generates any revenue." A falloff of growth in the meantime could clobber Microsoft stock, which traded recently at $81 a share. It would also subtract billions of dollars from Gates's personal fortune: His net worth would drop about $780 million for each $10 the stock declined.

In September, at an annual gathering of top PC types in Scottsdale, Arizona, Gates reflected to FORTUNE on the potentially jarring transition for Microsoft to the new world ahead. He said he doesn't expect Microsoft's current preeminence to guarantee it a commanding place on the next wave; success will depend much more on his and Myhrvold's ability to hire and manage brilliant technologists. If Microsoft stock did tank, he said, he would leverage every penny he owns—he estimated his current liquid wealth at $700 million to $800 million—to take Microsoft private and keep fighting to realize his information-at-your-fingertips vision.

Will either Gates or Ellison bestride the information highway as they do the software business today? Like databases and operating systems, the highway may spawn its own billionaires—perhaps from among the Generation Xers still playing Nintendo in their parents' living rooms. But Gates and Ellison have more than their share of what it takes to win: drive, audacity, ruthlessness, ego—and the foolishness to be dreamers. F

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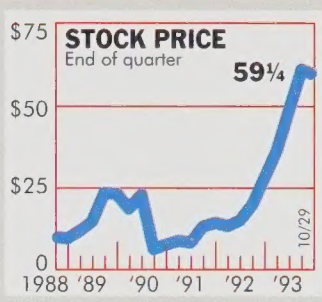

■ Profits tanked in 1990, as Oracle lost control in a relentless push for market share. Since regaining its grip, the company has cashed in on the networking craze.

SALES (latest four quarters) Change from year earlier	**$1.6 billion** Up 28.5%
NET PROFIT	**$169.1 million** Up 561.2%
RETURN ON EQUITY	**30.5%**
TOTAL RETURN TO INVESTORS 10/31/88–10/29/93 (annual rate)	**49.7%**
PRICE/EARNINGS MULTIPLE	**51.5**
DIVIDEND YIELD	**None**

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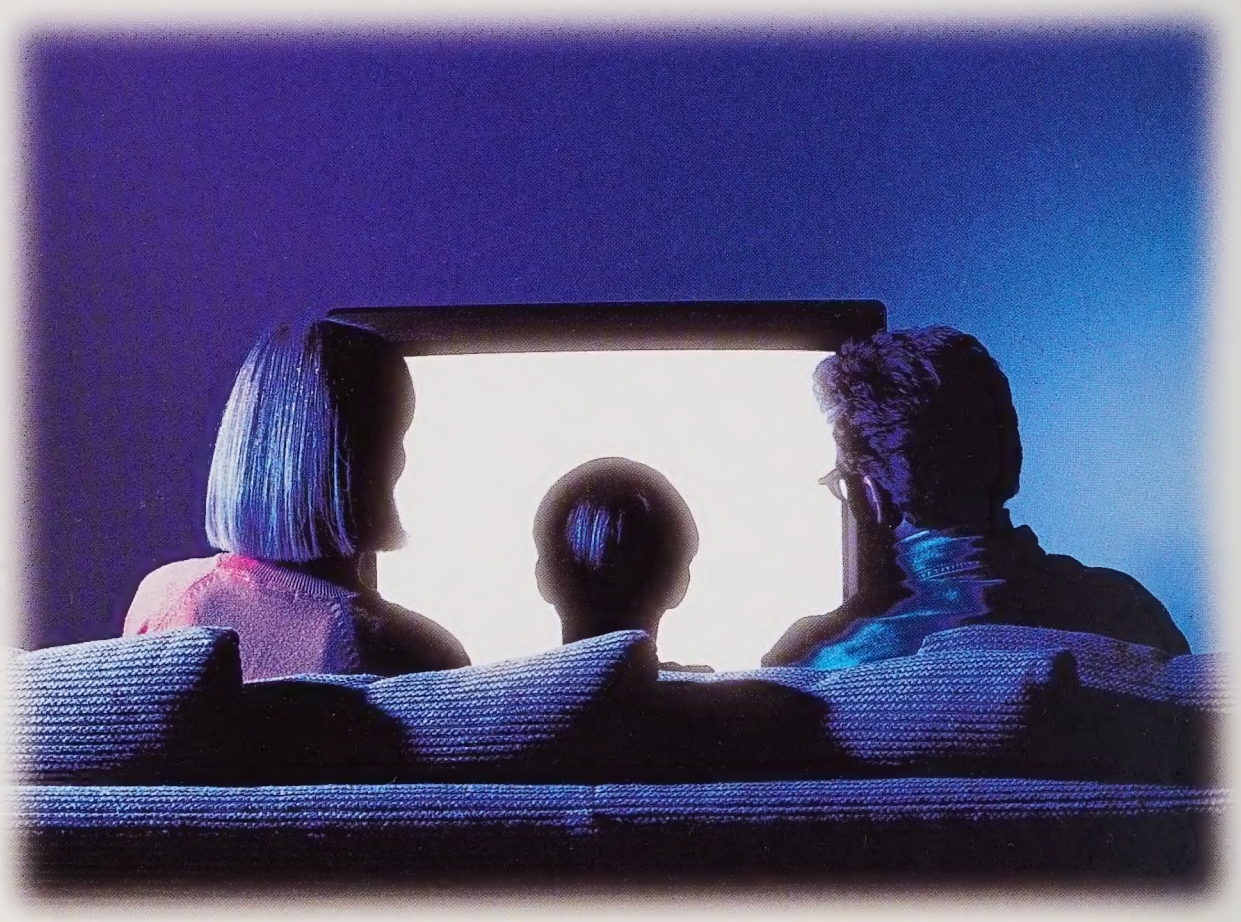
THE HOT TOPIC IN EVERY BOARDROOM.



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